LIFE CYCLE COST ANALYSIS
CITY OF PORTAGE - 1.5 MG ELEVATED TANK
BID EVALUATION

The following is a net present value (NPV) analysis of future maintenance costs comparing several tank styles bid to the City of Portage, Michigan. The analysis was performed by an independent tank coatings specialist in steel tank coatings and was used as a basis for selecting the most economical proposal and contract award.

ELEVATED TANK DATA

Capacity	1.5 Million Gallons
Operating Range	40 Feet
High Water Level	132 Feet Above Grade

COATINGS DATA

Coatings Areas (S.F.)	Composite	Spheroid	Hydro Pillar
Exterior	18,850 SF	24,500 SF	41,200 SF
Dry Interior	---	8,800	39,900
Wet Interior	23,200	19,300	25,500
Total	42,050 SF	52,600 SF	106,600 SF

Coatings Costs:		
	Exterior Repaint	$4.00/ SF
	Exterior Repair	1.80
	Dry Interior Repaint	3.50
	Dry Interior Repair	1.75
	Wet Interior Repaint	4.00

EVALUATION ASSUMPTIONS

1. Maintenance was evaluated over both a 50-year and 65-year cycle.
2. Rate of inflation, or escalation of coatings cost to average five percent per year.
3. Interest rate, or return on money invested (cost of $) to average eight percent per year.
4. Maintenance Schedule -
   Exterior   - coatings are removed to bare metal on 30-year cycles.
                 - surfaces are repaired (potential hydro blast and reapply final coat) at
                   12 and 21 years after initial coatings application or repaint.
   Dry Interior - coatings are removed to bare metal on 31-year cycles.
                 - surfaces are repaired at 15 and 23 years after initial coatings application
                   or repaint.
   Wet Interior - coatings are removed to bare metal on 15-year cycles (no repair).

COMPARISON - PRESENT WORTH OF FUTURE MAINTENANCE

Coatings Areas	Composite	Spheroid	Hydro pillar
Exterior	107,822	140,140	235,664
Dry Interior	---	44,000	199,500
Wet Interior	144,072	119,853	158,355
Total	**$251,894**	**$303,993**	**$593,519**

CONCLUSION

Based on the above coatings maintenance considerations (65-year cycle), the Composite option has a bid advantage of $52,099 over the Spheroid and an advantage of $341,625 over the Hydro Pillar.

TABLE OF NFV (5%) AND NPV (8%) FACTORS

n (yrs)	NFV	NPV	n (yrs)	NFV	NPV	n (yrs)	NFV	NPV
12	1.796	0.397	31	4.538	0.092	54	13.939	0.016
15	2.079	0.315	42	7.762	0.040	60	18.679	0.010
21	2.786	0.199	45	8.985	0.031	62	20.594	0.009
23	3.072	0.170	46	9.434	0.029			
30	4.322	0.099	51	12.040	0.020			

2. Present Worth Unit Coatings Cost

EXTERIOR

Year	Unit Cost	NFV Factor	NPV Factor	Present Worth
12	$1.80/SF (repair)	1.796	0.397	$ 1.28/SF
21	1.80 (repair)	2.786	0.199	1.00
30	4.00 (repaint)	4.322	0.099	1.72
42	1.80 (repair)	7.762	0.040	.55
51	1.80 (repair)	12.041	0.020	.43
60	4.00 (repaint)	18.679	0.010	.74
			Total	$ 5.72/SF

DRY INTERIOR

Year	Unit Cost	NFV Factor	NPV Factor	Present Worth
15	$1.75/SF (repair)	2.079	0.315	$ 1.15/SF
23	1.75 (repair)	3.072	0.170	.92
31	3.50 (repaint)	4.538	0.092	1.46
46	1.75 (repair)	9.434	0.029	.48
54	1.75 (repair)	13.939	0.016	.38
62	3.50 (repaint)	20.594	0.009	.61
			Total	$ 5.00/SF

WET INTERIOR

Year	Unit Cost	NFV Factor	NPV Factor	Present Worth
15	$4.00/SF(repaint)	2.079	0.315	$ 2.62/SF
30	4.00 (repaint)	4.322	0.099	1.72
45	4.00 (repaint)	8.985	0.031	1.13
60	4.00 (repaint)	18.679	0.010	.74
			Total	$ 6.21/SF

PRESENT WORTH ANALYSIS

1. Maintenance Cost Factors

a) Future Cost = Present Cost X Net Future Value (NFV) Factor

NFV Factor = $(1+i)^n$, where i = rate of inflation (5%) ; n = number of years

b) Present Worth = Future Cost X Net Present Value (NPV) Factor

NPV Factor = $\dfrac{1}{(1+i)^n}$, where i = rate of interest (8%); n = number of years